WASHCOUNTS

2026 State Competition
Sprint Round Problems 1–30

HONOR PLEDGE

I pledge to uphold the highest principles of honesty and integrity as a math competitor. I will neither give nor receive unauthorized assistance of any kind. I will not copy another's work and submit it as my own. I understand that any competitor found to be in violation of this honor pledge is subject to disqualication.

Signature _____ Date _____

Printed Name _____

School _____

Chapter _____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This section of the competition consists of 30 problems. You will have 40 minutes to complete all the problems. You are not allowed to use calculators, books or other aids during this round. Calculations may be done on scratch paper. All answers must be complete, legible and simplified to lowest terms. Record only final answers in the blanks in the left-hand column of the competition booklet. If you complete the problems before time is called, use the remaining time to check your answers.

In each written round of the competition, the required unit for the answer is included in the answer blank. The plural form of the unit is always used, even if the answer appears to require the singular form of the unit. The unit provided in the answer blank is the only form of the answer that will be accepted.

Total Correct	Scorer's Initials

Problem Development Committee

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Special thanks to Jason Lee for providing the competition templates.

0 1 2 3 4 5 6 7 8 9

1. _____ Felix starts at 2 and counts by 4s up to 2026. He forgets to say the 34^{th} number in the sequence. Which number does he forget?

2. _____ triangles Ryan draws 12 shapes with 50 line strokes. Each shape is either a triangle (3 strokes) or a pentagon (5 strokes). How many triangles did Ryan draw?

3. _____ in^2 Jackson eats one slice of a 16-inch diameter pizza cut into 8 equal pieces. To the nearest whole number, how many square inches is the area of his slice?

4. _____ Renting a car from Company A costs \$10 plus \$5 per hour. Renting from Company B costs \$5 plus \$$x$ per hour. If the cost for a 5-hour rental is the same for both companies, what is the value of x?

5. _____ What is the smallest composite number that is not divisible by 2 or 3?

6. _____ What is the value of $37 \times 999 + 111 \times 67$?

7. _____ Five friends play tag. One is randomly chosen to be "it". That person then randomly tags one of the other four friends, who becomes the new "it". If Heather is one of the five friends, what is the probability that she is "it" after this first tag? Express your answer as a common fraction.

8. _____ students In a certain class, $1/3$ of the students received an 'Excellent' grade, $1/2$ received 'Good', and $1/7$ received 'Pass'. If the remaining students in the class failed, what is the minimum possible number of students in the class?

9. _____ If $\sqrt{16^{16} + 16^{16} + 16^{16} + 16^{16}} = 2^x$, what is the value of x?

10. _____ units A rectangular chocolate bar measures 9 units by 10 units. Jacob eats a 5×5 square portion from one corner. Vincent then eats a 5×5 square portion from the diagonally opposite corner, which divides the remaining chocolate into two congruent pieces. What is the perimeter of one of these pieces?

11. _____ What is the rightmost nonzero digit of the product $2025 \cdot 2026$?

12. _____ Four distinct points are chosen on the circumference of a circle. The points are randomly partitioned into two pairs, and a segment is drawn connecting the points in each pair. What is the probability that the two segments divide the circle into four regions? Express your answer as a common fraction.

13. _____ For non-negative numbers x and y, let $x \triangle y = x + y + 2\sqrt{xy}$. What is the value of $1 \triangle (4 \triangle (9 \triangle (16 \triangle 25)))$?

14. _____ An isosceles trapezoid has bases of length 20 and 26. If its perimeter is 56, what is the area of the trapezoid?

15. _____ ways A math club has 3 freshmen, 4 sophomores, and 5 juniors. In how many ways can first, second, and third place be awarded to students from three different grades if the freshman must place ahead of the sophomore?

16. _____ seconds

Vanessa and Fei run from Newport to Interlake at 6 and 7 ft/s, respectively. Jaelyn runs from Interlake to Newport at 8 ft/s. If the distance between the schools is $31,500$ feet, how many seconds pass between Jaelyn meeting Fei and Jaelyn meeting Vanessa?

17. _____

An integer is *heavenly* if it is divisible by 7 and *sevenly* if its digits sum to 7. What is the smallest 3-digit integer that is both heavenly and sevenly?

18. _____ feet

Alex repeats the following pattern: 2 steps east, 1 step north, 2 steps west, and 1 step south. Each step is 2 feet long. After taking 2026 individual steps, how many feet is Alex from his starting point? Express your answer in simplest radical form.

19. _____ permutations

The first row of a 5×5 multiplication table (initially 1, 2, 3, 4, 5) is permuted. How many such permutations result in the sum of the numbers in each column being divisible by 3?

1	2	3	4	5
2	4	6	8	10
3	6	9	12	15
4	8	12	16	20
5	10	15	20	25

20. _____

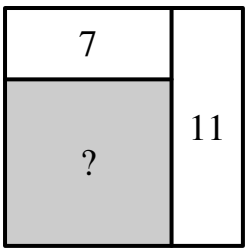
What is the value of

$$\left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\left(1-\frac{1}{4^2}\right)\cdots\left(1-\frac{1}{10^2}\right)?$$

Express your answer as a common fraction.

21. _____ Two ducks are at random locations on the edge of a circular pond of radius 2 meters. A circular island of radius 1 meter is at the center of the pond. What is the probability that the straight-line path between the ducks does not intersect the island? Express your answer as a common fraction.

22. _____ The figure consists of a large square subdivided into three regions: a smaller shaded square and two non-shaded rectangles with areas 7 and 11, as shown. What is the area of the shaded square? Express your answer as a common fraction.



23. _____ A rectangular prism has unknown dimensions. Increasing its length by 2 increases its volume by 40; increasing its width by 3 increases its volume by 90; and increasing its height by 4 increases its volume by 96. What is the surface area of the original rectangular prism?

24. _____ A square and a right triangle have equal area. The sum of the triangle's legs is equal to the perimeter of the square. What is the ratio of the triangle's hypotenuse to the square's side length? Express your answer in simplest radical form.

25. _____ What is the value of

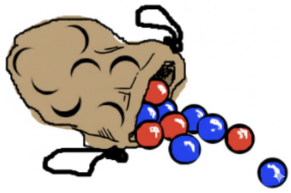
$$\left(\frac{1}{2}+\frac{1}{3}+\cdots+\frac{1}{2025}+\frac{1}{2026}\right)\left(1+\frac{1}{2}+\cdots+\frac{1}{2024}+\frac{1}{2025}\right)$$

$$-\left(1+\frac{1}{2}+\cdots+\frac{1}{2025}+\frac{1}{2026}\right)\left(\frac{1}{2}+\frac{1}{3}+\cdots+\frac{1}{2024}+\frac{1}{2025}\right)?$$

Express your answer as a common fraction.

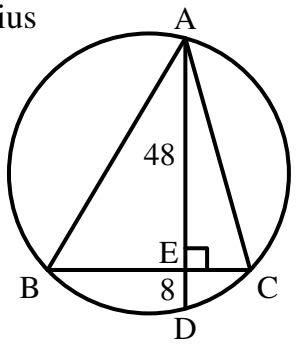
26. _____ What is the sum of all positive integers for which 77 is their largest proper divisor?

27. _____ marbles A bag contains 5 red and b blue marbles. The marbles are drawn one at a time at random without replacement. If the probability that the last three marbles drawn are all red is less than 1%, what is the smallest number of total marbles in the bag?



28. _____ If $f(x) + 2f(1-x) = x^2$ for all x, what is the value of $f(f(0))$? Express your answer as a common fraction.

29. _____ Let triangle ABC be inscribed in circle ω with radius 29. Point D lies on ω such that AD $\perp$ BC. If AD and BC intersect at E such that AE = 48 and ED = 8, what is the length of BC?



30. _____ A calculator initially shows 0. Pressing the "2" button is equally likely to increase the current value by 2, double the current value, or square the current value. If the button is pressed 5 times, what is the probability the resulting value is divisible by 4? Express your answer as a common fraction.

Forms of Answers

The following list explains acceptable forms for answers. Coaches should ensure that Mathletes are familiar with these rules prior to participating at any level of competition. Competition answers will be scored in compliance with these rules for forms of answers.

Units of measurement are not required in answers, but they must be correct if given. When a problem asks for an answer expressed in a specific unit of measure or when a unit of measure is provided in the answer blank, equivalent answers expressed in other units are not acceptable. For example, if a problem asks for the number of ounces and 36 oz is the correct answer, 2 lbs 4 oz will not be accepted. If a problem asks for the number of cents and 25 cents is the correct answer, \$0.25 will not be accepted.

The plural form of the units will always be provided in the answer blank, even if the answer appears to require the singular form of the units.

Geometric figures may not be drawn to scale and lengths of geometric figures should be assumed to be measured in "units" unless otherwise stated.

All answers must be expressed in simplest form. A "common fraction" is to be considered a fraction in the form $\pm\frac{a}{b}$, where a and b are natural numbers and GCF(a, b) = 1. In some cases the term "common fraction" is to be considered a fraction in the form $\frac{A}{B}$, where A and B are algebraic expressions and A and B do not share a common factor. A simplified "mixed number" ("mixed numeral," "mixed fraction") is to be considered a fraction in the form $\pm N\frac{a}{b}$, where N, a and b are natural numbers, $a < b$ and GCF(a, b) = 1. Examples:

Problem: What is 8 ÷ 12 expressed as a common fraction? *Answer:* $\frac{2}{3}$ *Unacceptable:* $\frac{4}{6}$

Problem: What is 12 ÷ 8 expressed as a common fraction? *Answer:* $\frac{3}{2}$ *Unacceptable:* $\frac{12}{8}$, $1\frac{1}{2}$

Problem: What is the sum of the lengths of the radius and the circumference of a circle with diameter $\frac{1}{4}$ unit expressed as a common fraction in terms of π? *Answer:* $\frac{1+2\pi}{8}$

Problem: What is 20 ÷ 12 expressed as a mixed number? *Answer:* $1\frac{2}{3}$ *Unacceptable:* $1\frac{8}{12}$, $\frac{5}{3}$

Ratios should be expressed as simplified common fractions unless otherwise specified. Examples:

Acceptable Simplified Forms: $\frac{7}{2}$, $\frac{3}{\pi}$, $\frac{4-\pi}{6}$ *Unacceptable:* $3\frac{1}{2}$, $\frac{\frac{1}{4}}{3}$, 3.5, 2:1

Radicals must be simplified. A simplified radical must satisfy: 1) no radicands have a factor which possesses the root indicated by the index; 2) no radicands contain fractions; and 3) no radicals appear in the denominator of a fraction. Numbers with fractional exponents are *not* in radical form. Examples:

Problem: What is $\sqrt{15} \times \sqrt{5}$ expressed in simplest radical form? *Answer:* $5\sqrt{3}$ *Unacceptable:* $\sqrt{75}$

Answers to problems asking for a response in the form of a dollar amount or an unspecified monetary unit (e.g., "How many dollars...," "How much will it cost...," "What is the amount of interest...") should be expressed in the form (\$) *a.bc* or *a.bc* (dollars), where *a* is an integer and *b* and *c* are digits. The *only* exceptions to this rule are when a is zero, in which case it may be omitted, or when b and c both are zero, in which case they both may be omitted. Answers in the form (\$) *a.bc* or *a.bc* (dollars) should be rounded to the nearest cent unless otherwise specified. Examples:

Acceptable Forms: 2.35, 0.38, .38, 5.00, 5 *Unacceptable:* 4.9, 8.0

Do not make approximations for numbers (e.g., π, $\frac{2}{3}$, $5\sqrt{3}$) in the data given or in solutions unless the problem says to do so.

Do not perform any intermediate rounding (other than the "rounding" a calculator does) when calculating solutions. All rounding should be done at the end of the computation process.

Scientific notation should be expressed in the form $a \times 10^n$ where a is a decimal, $1 \le |a| < 10$, and n is an integer. Examples

Problem: What is 6895 expressed in scientific notation? *Answer:* 6.895×10^3

Problem: What is 40,000 expressed in scientific notation? *Answer:* 4×10^4 *or* 4.0×10^4

An answer expressed to a greater or lesser degree of accuracy than called for in the problem will not be accepted. Whole-number answers should be expressed in their whole-number form. Thus, 25.0 will not be accepted for 25, and 25 will not be accepted for 25.0.

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